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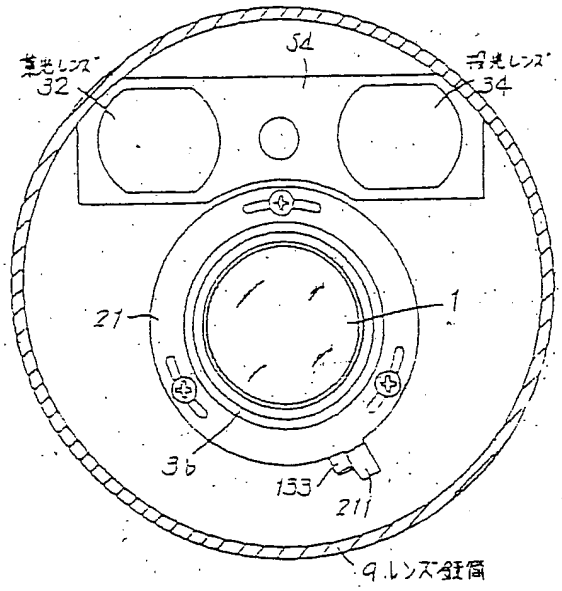
(54)【発明の名称】カメラ

(57)【要約】
【目的】　レンズ鏡筒の大型化を防止しつつ鏡筒内収納部品の収納に必要なスペースをレンズ鏡筒内に確保して、カメラボディの小型化を図る。
【構成】　撮影レンズ1の光軸に沿って進退可能なレンズ鏡筒9を有するカメラにおいて、レンズ鏡筒9の進退方向に延びる中心軸を撮影レンズ1の光軸に対して偏心させる。偏心により拡大したスペースに例えば測距光学系30などの鏡筒内収納部品を収納する。



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【特許請求の範囲】

【請求項１】　撮影レンズの光軸に沿って進退可能なレンズ鏡筒を有するカメラにおいて、前記レンズ鏡筒の進退方向に延びる中心軸を前記撮影レンズの光軸に対して偏心させたことを特徴とするカメラ。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、撮影レンズの光軸方向へ進退可能なレンズ鏡筒を備えたカメラに関する。

【０００２】

【従来の技術】従来この種のカメラとしては、カメラボディに対するレンズ鏡筒の繰り出し量を変化させて撮影レンズの焦点距離を変更する可変焦点カメラが知られている。この可変焦点カメラにおいては、撮影レンズの光軸とレンズ鏡筒の中心軸とが一致するようにこれらの配置が定められ、撮影レンズの外周とレンズ鏡筒の内周面との間の隙間に、絞り兼用シャッタや焦点調整機構のアクチュエータなどの鏡筒内収納部品が収納される。

【０００３】

【発明が解決しようとする課題】上述したカメラでは、鏡筒内収納部品の収納スペースを拡大するためにはレンズ鏡筒を大径化せざるを得ないところ、鏡筒内収納部品は撮影レンズの外周上の特定箇所に偏って配置されるため、一部の鏡筒内収納部品のためのみにレンズ鏡筒が大径化して鏡筒内収納部品の入らない位置では大きな無駄スペースが生じることになる。レンズ鏡筒が大型化すれば、これを撮影レンズの光軸方向へ進退させるための駆動機構の大型化も避けられず、カメラボディの小型化を図る上で大きな障害となる。

【０００４】本発明の目的は、レンズ鏡筒の大型化を防止しつつ鏡筒内収納部品の収納に必要なスペースをレンズ鏡筒内に確保して、カメラボディを小型化できるカメラを提供することにある。

【０００５】

【課題を解決するための手段】一実施例を示す図１に対応付けて説明すると、本発明は、撮影レンズ１の光軸に沿って進退可能なレンズ鏡筒９を有するカメラに適用される。そして、レンズ鏡筒９の進退方向に延びる中心軸を撮影レンズ１の光軸に対して偏心させることにより上述した目的を達成する。

【０００６】

【作用】レンズ鏡筒９を大型化することなく、鏡筒内収納部品３０を収納するに適した大きなスペースをレンズ鏡筒９の中心軸の偏心方向側に設けることができる。

【０００７】なお、本発明の構成を説明する上記課題を解決するための手段と作用の項では、本発明を分かり易くするために実施例の図を用いたが、これにより本発明が実施例に限定されるものではない。

【０００８】

【実施例】以下、図１～図４を参照して本発明の一実施例を説明する。図１～図４は本発明の一実施例を示す。

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レンズ鏡筒部分の縦断面を示す図１において、３群構成の主レンズ１は外周面にヘリコイドねじ３ａが刻設された保持筒３に保持され、その保持筒３がシャッタ基盤５のヘリコイド５１に螺合されている。シャッタ基盤５には主レンズ１の後方部分５２でシャッタ７が保持され、主レンズ１の上方の保持体５３に後述の測距光学系３０が設けられている。

【０００９】円筒状のレンズ鏡筒９内にはシャッタ基盤５がそれと一体に固着され、レンズ鏡筒９の外周に刻設されたヘリコイドねじ９１が、レンズ鏡筒９の外周に設けられた鏡筒送り筒１１のヘリコイドねじ１１１と螺合し、レンズ鏡筒９それ自体は、図示しないカメラボディに立設された回転阻止部材によりその回転が阻止され、かつ、光軸方向の移動は自由とされ、従って、鏡筒送り筒１１が回転するとそれに応じてレンズ鏡筒９が光軸に沿って移動する。すなわち、短焦点撮影時の退避位置（図１）と長焦点撮影時の突出位置（図２）との間で移動する。なお、１０はカバーを示す。

【００１０】また、保持筒３が螺合されたシャッタ基盤５の円筒部５４には主レンズ１の光軸を中心に回動可能に連動リング１３が外挿されている。図４に示すとおり、連動リング１３に形成されたギア１３１と噛合するギア１５１を有するモータ１５がシャッタ基盤５に保持されている。更に、連動リング１３には円筒カム１３２が連設されている。

【００１１】図４において、回動中心Ｏ１を中心に回動可能とされたレバー１７のカムフォロア１７１がカム１３２に当接係合されている。レバー１７の他端にはピン１７２が立設され、回動中心Ｏ２を中心として回動可能とされたレバー１９の係合部１９１がピン１７２と係合されている。ここで、連動リング１３、モータ１５、レバー１７、１９が走査手段４０を構成する。また、連動リング１３はカメラ前方に突設された係合腕１３３を有し、図３に示すとおり、保持筒３の前面３ｂに螺着されたバック調整リング２１の係合腕２１１と係合し、モータ１５の回転が連動リング１３を介して保持筒３に伝達される。連動リング１３、モータ１５、バック調整リング２１が撮影光学系の駆動手段５０を構成する。

【００１２】図１および図４に示すように、測距光学系３０は、シャッタ基盤５に固定保持された受光素子３１と、受光素子３１上に後述の反射光を集光する集光レンズ３２と、レバー１９の一端に固着された発光素子３３と、発光素子３３からの出射光を被写体に向けて射出する投光レンズ３４とを有する。図３に示すように、集光レンズ３２および投光レンズ３４はそれぞれの周縁に互いに並行な一対の切欠部３２ａ，３４ａを備える。これら切欠部３２ａ，３４ａを設けたことにより、保持体５３が小型化されてレンズ鏡筒９の大径化が抑制される。なお、図４では、簡略化のため集光レンズ３２および投

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光レンズ３４をともに円形に削いている。

【００１３】また、図１および図３から明らかなように、主レンズ１はその光軸をレンズ鏡筒９の中心軸よりも下方へ偏心させて取り付けられている。これにより、レンズ鏡筒９の大径化を防ぎつつ測距光学系３０の収納スペースを拡大できる。そして、受光素子３１と発光素子３３は自動焦点検出回路４１と接続され、発光素子３３は変調光を発光するように制御され、受光素子３１の出力信号に基づいて測距が行なわれる。その検出回路４１は演算処理装置（以下、ＣＰＵ）４２と接続され、ＣＰＵ４２にはモータ駆動回路４３が後続されてモータ１５が制御される。なお、これら検出回路４１，ＣＰＵ４２，モータ駆動回路４３等の電気要素もシャッタ基盤５に一体に保持されている。

【００１４】このように構成された実施例の動作を説明する。短焦点撮影では、図１に示すとおりレンズ鏡筒９が鏡筒送り筒１１内に退避した位置にあり、主レンズ１により焦点距離が定められる。図示しないシャッタ釦が半押しされるとＣＰＵ４２からの指令によりモータ駆動回路４３が働いてモータ１５が回転を始めるとともに検出回路４１により発光素子３３が変調光を出射する。図４において、モータ１５が反時計方向に回転すると連動リング１３が時計方向に回転しレバー１７が反時計方向に回動する。レバー１７に連動してレバー１９が時計方向に回動すると発光素子３３も時計方向に回動し、投光レンズ３４を介して変調光により被写体が走査される。そして、モータ１５の回転は係合腕１３３，２１１を介してバック調整リング２１に伝達されて保持筒３が回転し、これにより主レンズ１がシャッタ基盤５に対して繰り出される。

【００１５】被写体に照射された変調光は反射し集光レンズ３２を介して二分割受光素子３１に入射する。一対の受光素子３１からの各出力は検出回路４１に入力され、周知の信号処理が施され、各受光素子３１の出力が一致した点を合焦位置と判別してＣＰＵ４２に判別信号が出力される。次いで、ＣＰＵからモータ駆動回路４３にモータ停止信号が出力され、モータ１５が停止される。これにより、保持筒３の繰り出しが止まり主レンズ１は被写体までの距離に応じた位置に制御されて合焦する。

【００１６】次に、図示していない駆動手段により鏡筒送り筒１１が回転するレンズ鏡筒９が光軸に沿ってカメラ前方に突出するとともに、主レンズ１の後方光軸に副レンズ２-３が挿入され、図２に示すようになって長焦点撮影が可能となる。図２からわかるように、レンズ鏡筒９の突出とともに撮影光学系を構成する主レンズ１、測距光学系３０、走査手段４０、モータ１５を含む駆動手段５０が一体に前進するので、これら各要素、系の相

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対位置関係に変わらない。長焦点撮影の場合も短焦点撮影と同様にして測距、焦点調節が行なわれる。短焦点撮影、長焦点撮影いずれの場合でも撮影距離に対する主レンズ１の繰り出し量は同じになるよう光学設計されている。その結果、同一カムが使える。

【００１７】以上説明したように、本実施例ではレンズ鏡筒９の偏心により測距光学系３０を収納するに必要なスペースをレンズ鏡筒９内に得ているので、レンズ鏡筒９と主レンズ１とを同軸にする従来例と比較してレンズ鏡筒９が小型化される。この結果、レンズ鏡筒９を主レンズ１の光軸方向へ進退させるための機構も小型化され、ひいてはカメラボディの小型化も可能となる。

【００１８】実施例では主レンズ１の光軸とレンズ鏡筒９の中心軸との偏心に伴って拡大したスペースに測距光学系３０を収納したが、本発明はこれに限るものではない。測距光学系３０をレンズ鏡筒９に収納しない場合は、これに代えて他の鏡筒内収納部品、例えばシャッタ基盤５を偏心で拡大したスペースに収納してもよい。二焦点カメラに限らず、単焦点カメラや三焦点以上のカメラでもレンズ鏡筒が進退する限り本発明を適用できる。

【００１９】

【発明の効果】以上説明したように、本発明では、レンズ鏡筒の中心軸を撮影レンズの光軸に対して偏心させたので、レンズ鏡筒の大型化を防止しつつ鏡筒内収納部品の収納に必要なスペースをレンズ鏡筒内に確保して、カメラボディの小型化を図ることができる。

【図面の簡単な説明】

【図１】本発明の一実施例のカメラの短焦点時におけるレンズ鏡筒前部の縦断面図。

【図２】本発明の一実施例のカメラの長焦点時におけるレンズ鏡筒前部の縦断面図。

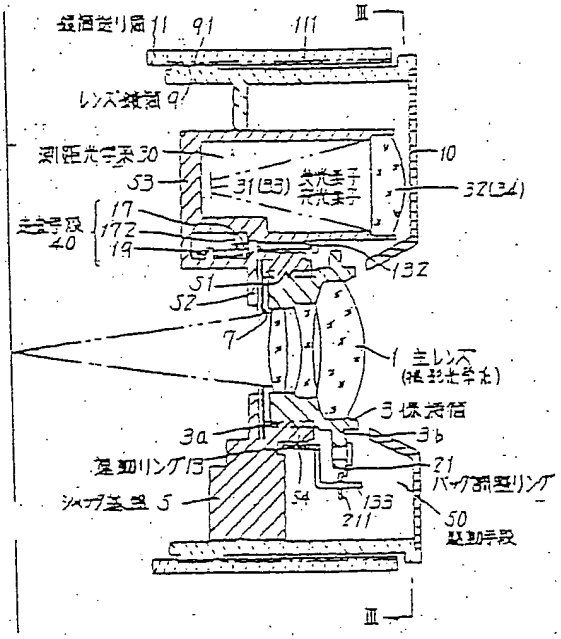
【図３】図１のIII－III線から見た正面図。

【図４】測距光学系３０周辺の図であり、焦点検出制御系のブロック図を含む図である。

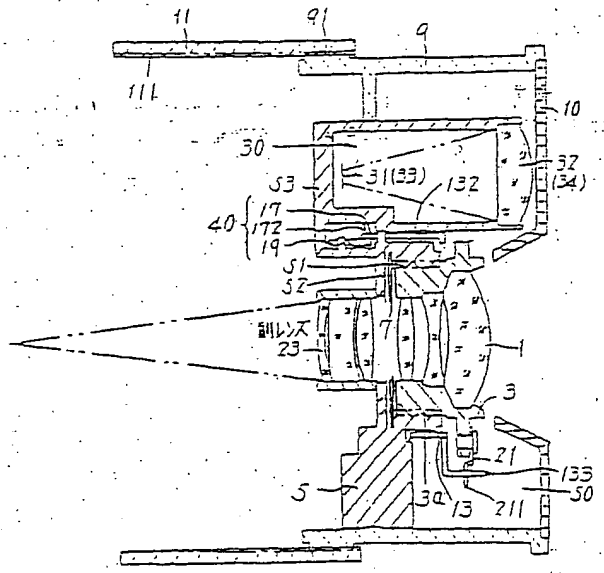
【符号の説明】

１　主レンズ
３　保持筒
５　シャッタ基盤
９　レンズ鏡筒
１１　鏡筒送り筒
１３　連動リング
２１　バック調整リング
３０　測距光学系
３１　受光素子
３３　発光素子
４０　走査手段
５０　駆動手段

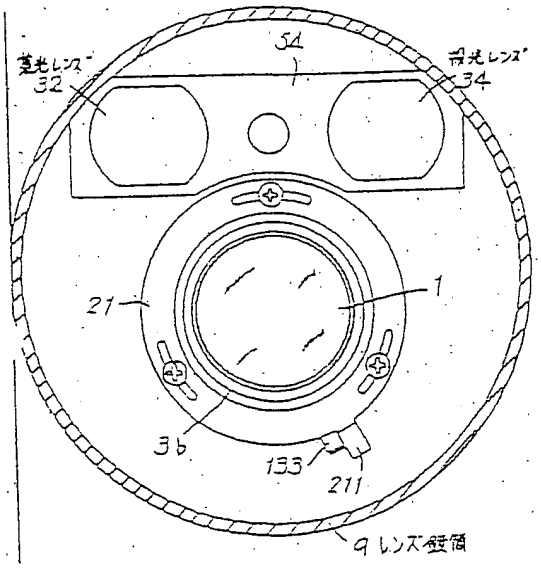
【図1】



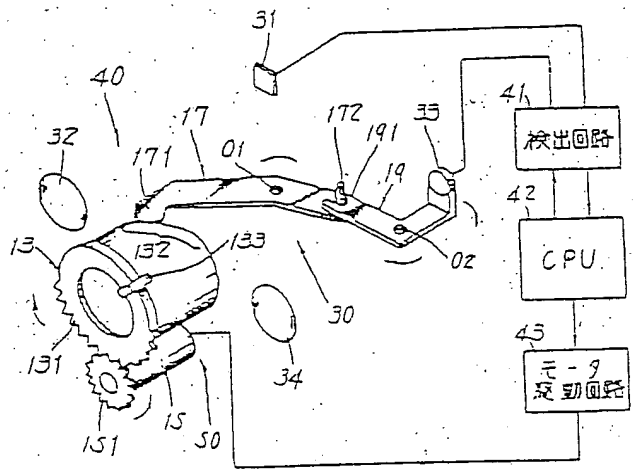
【図2】



【図3】



【図4】



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Applicant: Nikon Inc., No. 2-3, 3-chome, Marunouchi, Chiyoda-ku, Tokyo

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Representative: F. Nagai, patent attorney

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[TITLE OF INVENTION] CAMERA

[SUJMMARY]

[Object] It is the object of the invention to miniaturize camera body by securing inside lens barrel a space necessary for containing parts to be contained inside lens barrel while preventing lens barrel from becoming larger.

[Construction] In a camera having a lens barrel 9 capable of advancing and retreating along the optical axis of the photographic lens 1, the central axis extending toward the advancing and retreating direction of the lens barrel 9 is decentered in respect of the optical axis of the photographic lens 1. Parts to be contained inside the lens barrel such as the distance metering optical system 30 are contained in the space expanded as result of decentering.

32
Condenser lens

34
Projector lens

9
Lens barrel

[PATENT CLAIM]

[Claim 1] A camera having a lens barrel capable of advancing and retreating along the optical axis of a photographic lens, wherein the central axis extending toward the advancing and retreating direction of the lens barrel is decentered in respect of the optical axis of the photographic lens.

[Detailed explanation of the invention]

[0001]

[Industrial application of the invention] The present invention relates to a camera having a lens barrel capable of advancing and retreating to the direction of the optical axis of the photographic lens.

[0002]

[Conventional technology] In a conventional camera of this type, a variable focus camera is known wherein the focal length of the photographic lens is changed by changing the extent of extension of the lens barrel in respect of the camera body. In such a variable focus camera, it is so arranged as to make the optical axis of the photographic lens coincide with the central axis of the lens barrel, and parts to be contained inside the lens barrel, such as a diaphragm/shutter or an actuator for focus adjusting mechanism, are contained in the spacing between the outer periphery of the photographic lens and the inner periphery of the lens barrel.

[0003]

[Problems which the present invention intends to solve] In the above-mentioned type of camera, the diameter of the lens barrel has to be made larger in order to expand the space to contain parts to be contained inside the lens barrel; however, the parts to be contained inside the lens barrel are arranged only at a specific position on the outer periphery of the photographic lens; and accordingly, the diameter of the lens barrel has to be made larger only for some parts to be contained inside the lens barrel, and this creates an unnecessary space at positions

where parts to be contained inside the lens barrel are not to be contained. As the lens barrel becomes larger, the enlargement of the drive mechanism for advancing and retreating it to the direction of the optical axis of the photographic lens can not be prevented, and this becomes a great obstacle for making camera body compact.

[0004] It is the object of the present invention to provide a camera wherein the camera body can be made compact by securing inside lens barrel a space necessary for containing parts to be contained inside lens barrel while preventing lens barrel from becoming larger.

[0005]

[Means to solve problems] Explanation will now be made in reference to Fig. 1 showing an example of embodiment. The present invention is applied to a camera having a lens barrel 9 capable of advancing and retreating along the optical axis of the photographic lens 1. And the above-mentioned object can be achieved by decentering the central axis extending to the advancing and retreating direction of the lens barrel 9 in respect of the optical axis of the photographic lens 1.

[0006]

[Operation] A large space suitable for containing the parts 30 to be contained inside the lens barrel can be provided on the side of the decentered direction of the central axis of the lens barrel 9 without enlarging the lens barrel 9.

[0007] Incidentally, in the foregoing paragraphs (Means to solve problems and Operation), an illustration of an embodiment is shown in order to facilitate understanding of the present invention; however, the present invention is not thereby restricted to such example of embodiment.

[0008]

[Example of embodiment] Explanation will now be made of one example of embodiment of the present invention by referring to Fig. 1 to Fig. 4. Fig. 1 to Fig. 4 show one embodiment of the present invention. In Fig. 1 showing a vertical section of the

lens barrel portion, the principal lens 1 made of 3 groups is retained by a retainer barrel 3 wherein a helicoid screw 3a is provided/carved on the outer peripheral part thereof, and the retainer barrel 3 is screwed to the helicoid 51 of the shutter baseboard 5. The shutter baseboard 5 retains the shutter 7 at the rear part 52 of the principal lens 1, and the distance metering optical system 30 to be referred to later is arranged in the retainer member 53 at the upward portion of the principal lens 1.

[0009] Inside the tubular shaped lens barrel 9, the shutter baseboard 5 is fixed in unison therewith, and the helicoid screw 91 which is provided/carved on the outer periphery of the lens barrel 9 meshes with the helicoid screw 111 of the lens barrel transport tube 11 arranged on the outer periphery of the lens barrel 9. The rotation of the lens barrel 9 itself is prevented by a rotation prevention member provided on the camera body (not illustrated), while its movement to the direction of the optical axis is made free, and consequently, as the lens barrel transport tube 11 rotates, the lens barrel 9 moves along the optical axis in association therewith. In other words, movement takes place between the retreated position in short focal length photographic mode (Fig. 1) and the extended position in long focal length photographic mode (Fig. 2). Incidentally, 10 shows a cover.

[0010] There is also provided a coupler ring 13, rotationally movable around the optical axis of the principal lens 1, on the outside of the tubular part 54 of the shutter baseboard 5 on which the retainer barrel 3 is screwed. As shown in Fig. 4, a motor 15 having a gear 151 meshing with the gear 131 formed on the coupler ring 13 is retained by the shutter baseboard 5. Furthermore, a tubular cam 132 is provided on and in association with the coupler ring 13.

[0011] In Fig. 4, the cam follower 171 of the lever 17, made rotationally movable around the rotation center O1 is engaged with the cam 132. At the other end of the lever 17, there is

provided a pin 172 which made to engage with the engagement part 191 of the lever 19 made rotationally movable around the rotation center O2. Here, the coupler ring 13, motor 15, levers 17 and 19 comprise a scanning means 40. Also, the coupler ring 13 has an engagement arm 133 provided in protrusion to the forward direction of the camera, and as shown in Fig. 3, it engages with the engagement arm 211 of the back adjustment ring 21 screwed onto the front plane 3b of the retainer barrel 3, and the rotation of the motor 15 is conveyed to the retainer barrel 3 via the coupler ring 13. The coupler ring 13, motor 15, and back adjustment ring 21 comprise the drive means 50 of the photographic optical system.

[0012] As illustrated in Fig. 1 and Fig. 4, the distance metering optical system 30 is comprised of a light receptor sensor 31 fixed on and retained by the shutter baseboard 5, a condenser lens 32 which condenses reflected light onto the light receptor sensor 31 as will be explained later, a light emitter element 33 fixed onto one end of the lever 19 and a projector lens 34 which projects the exit light from the light emitter element 33 to the direction of a photographic object. As shown in Fig. 3, the condenser lens 32 and the projector lens 34 have a pair of cutouts 32a and 34a on the periphery thereof respectively in parallel. Installation of these cutouts 32a and 34a is helpful in making the retainer member 53 small and enlargement of the diameter of the lens barrel 9 is thereby restrained. In Fig. 4, incidentally, the condenser lens 32 and the projector lens 34 are illustrated in a round shape for sake of simplification.

[0013] Also, as will be clear from Fig. 1 and Fig. 3, the principal lens 1 is mounted with its optical axis downwardly decentered from the central axis of the lens barrel 9. This is helpful in expanding the space for containing the distance metering optical system 30 while preventing increase of the diameter of the lens barrel 9. And the light receptor sensor 31 and the light emitter element 33 are connected to the automatic focus detection circuit 41, the light emitter element 33 is so controlled as to emit

modulated light and distance metering is performed according to the output signal of the light receptor sensor 31. This detection circuit 41 is connected to the computation processing unit 42 (referred to as "CPU" hereunder), which is connected to the motor drive circuit 43 for controlling the motor 15. Incidentally, the electrical elements of this detection circuit 41, CPU 42, and motor drive circuit 43 are also retained in unison on the shutter baseboard 5.

[0014] The operation of the embodiment thus constructed will now be explained. In short focal length photography, as shown in Fig. 1, the lens barrel 9 is in its recessed position inside the lens barrel transport tube 11, and the focal length is determined by the principal lens 1. As the shutter button (not illustrated) is half-depressed, the motor drive circuit 43 starts working according to a command from the CPU 42, the motor 15 starts its rotation and the light emitter element 33 emits modulated light by way of the detection circuit 41. In Fig. 4, as the motor 15 rotates to the counterclockwise direction, the coupler ring 13 rotates to the clockwise direction and the lever 17 rotates to the counterclockwise direction. As the lever 19 rotationally moves to the clockwise direction in association with the lever 17, the light emitter element 33 also rotationally moves to the clockwise direction, and the photographic object is scanned with modulated light via the light projector lens 34. And the rotation of the motor 15 is conveyed to the back adjustment ring 21 via the engagement arms 133 and 211, the retainer barrel 3 rotates and this causes the principal lens 1 to be extended against the shutter baseboard 5.

[0015] The modulated light projected onto the photographic object is reflected and enters the bi-sectional light receptor sensor 31 via the condenser lens 32. The output from each of the pair of light receptor sensor 31 enters the detection circuit 41, where the signal is processed according to a known method, and the point where the output from each of the light receptor sensor 31 coincides is judged as an in-focus point and a judgment

signal is output to the CPU 42. Thereafter, a motor stop signal is output from the CPU to the motor drive circuit 43 and the motor 15 is stopped. Thus, the extension of the retainer barrel 3 is stopped and the principal lens 1 is controlled and comes into focus according to the distance to the photographic object.

[0016] In succession, according to a drive means (not illustrated), the lens barrel transport tube 11 with the rotating lens barrel 9 is extended to the camera's forward direction along the optical axis, a secondary lens 23 is inserted to the rear optical axis of the principal lens 1, thus enabling long focal length photography as illustrated in Fig. 2. As is clear from Fig. 2, the drive means 50, comprising the principal lens 1 comprising the photographic optical system, the distance metering optical system 30, the scanning means 40 and the motor 15, moves forward in unison, in association with the extension of the lens barrel 9, and hence the relative positional relationship among these elements and systems do not change. In long focal length photography, also, distance metering and focus adjustment are likewise performed as in short focal length photography. In either case of short focal length photography or long focal length photography, it is so optically designed that the amount of extension of the principal lens 1 remains the same in respect of the distance of photography. Consequently, the same cam can be used.

[0017] As has been explained above, according to this embodiment, a necessary space for containing the distance metering optical system 30 is secured inside the lens barrel 9 by decentering the lens barrel 9, the lens barrel can be made compact, in comparison with the conventional example where the lens barrel 9 and the principal lens 1 are brought onto the same axis. As a result of this, the mechanism for advancing and retreating the lens barrel 9 to the direction of the optical axis of the principal lens 1 can also be made compact, and this further makes it possible to make camera body compact.

[0018] According to this embodiment, the distance metering

optical system 30 is contained in the space which is expanded in association with the decentering of the optical axis of the principal lens 1 from the central axis of the lens barrel 9; however, the present invention is not restricted to this embodiment. In case where the distance metering optical system 30 is not to be contained inside the lens barrel 9, other parts to be contained inside the lens barrel, such as tge shutter baseboard 5 for example, may be contained inside the space expanded as result of decentering. The present invention can be applied not only in a bifocal length camera, but in a single-focal length camera or three- or more focal length camera, as long as the lens barrel advances and retreats.

[0019]

[Benefits of invention] According to the present invention, as has been explained so far, the central axis of the lens barrel is decentered in respect of the optical axis of the photographic lens, and consequently the camera body can be made compact by securing inside lens barrel a space necessary for containing parts to be contained inside lens barrel while preventing lens barrel from becoming larger.

[Brief explanation of the drawings]

[Fig. 1] Vertical sectional drawing of the front part of the lens barrel in short focal length mode in a camera in one example of embodiment of the present invention.

[Fig. 2] Vertical sectional drawing of the front part of the lens barrel in long focal length mode in a camera in one example of embodiment of the present invention.

[Fig. 3] From view of Fig. 1 seen from the line III-III.

[Fig. 4] Drawing of the periphery of the distance metering optical system 30, including a block diagram of the focal length detection control system.

[Explanation of the reference marks]

1 Principal lens

3 Retainer barrel

5 Shutter baseboard

9 Lens barrel

11 Lens barrel transport tube

13 Coupler ring

21 Back adjustment ring

30 Distance metering optical system

31 Light emitter element

33 Light receptor sensor

40 Canning means

50 Drive means

-- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --

[Fig. 1]

11

Lens barrel transport tube

9

Lens barrel

30

Distance metering optical system

31 (33)

Light receptor sensor

Light emitter element

40

Scanning means

1

Principal lens (photographic optical system)

3

Retainer barrel

13
Coupler ring

5
Shutter baseboard

21
Back adjustment ring

50
Drive means

[Fig. 2]

23
Secondary lens

[Fig. 3]

32
Condenser lens

34
Projector lens

9
Lens barrel

[Fig. 4]

41
Detection circuit

43

Motor drive circuit

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Intl. Cl.

Identification mark

Office filing number FI

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Fig.1

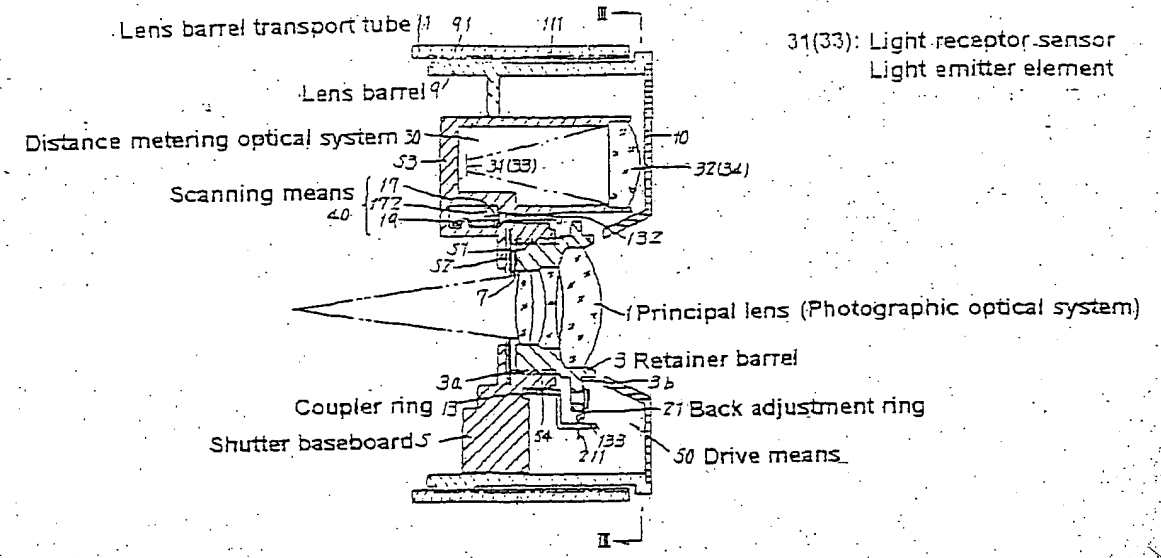

Lens barrel transport tube
Lens barrel
Distance metering optical system
Scanning means
31(33): Light receptor sensor
Light emitter element
Principal lens (Photographic optical system)
Retainer barrel
Coupler ring
Back adjustment ring
Shutter baseboard
Drive means

Fig.2

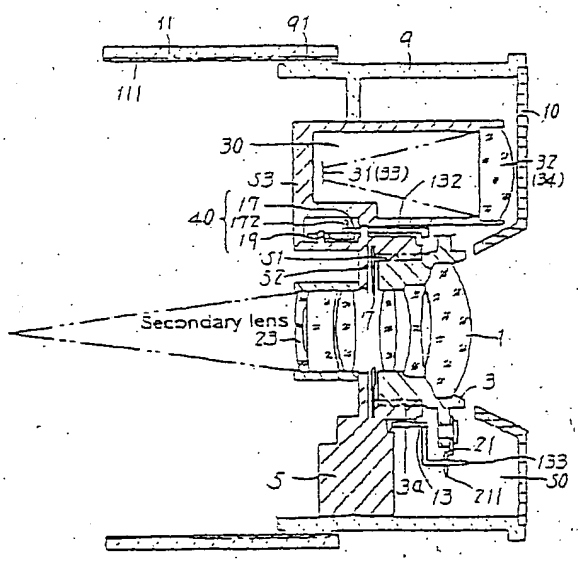

Secondary lens

Fig.3

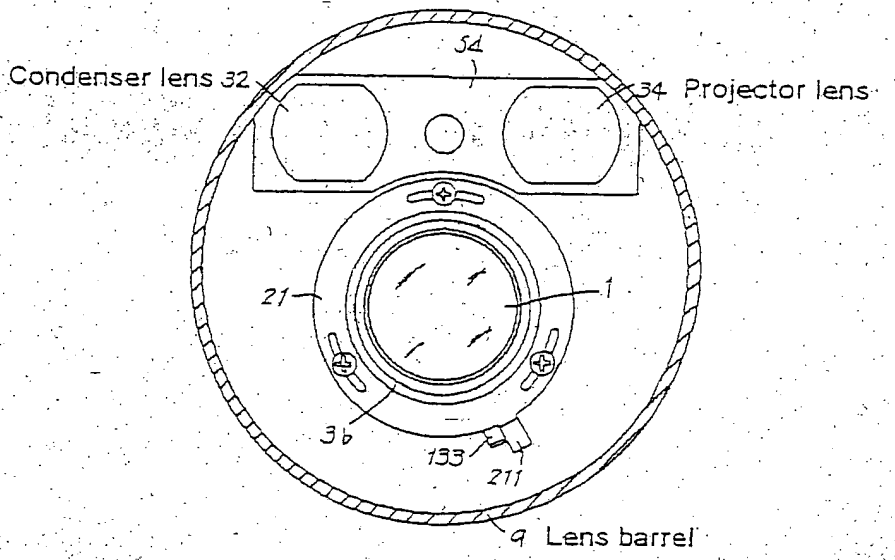
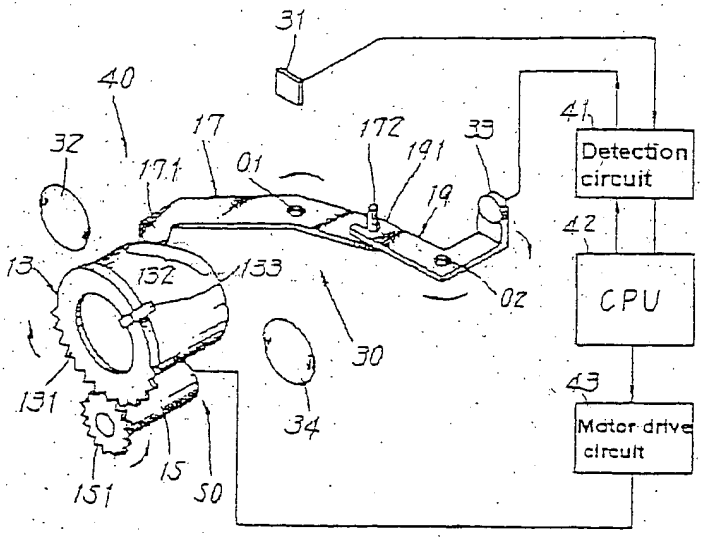

Condenser lens 32
54
34 Projector lens
21
1
36
133
211
9 Lens barrel

Fig.4


31
40
32
17
171
01
172
191
33
41
Detection circuit
19
42
CPU
13
132
133
02
30
131
34
43
Motor drive circuit
151
15
50